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NATIONAL DEVELOPMENTS

LEADING CADRES OF SCIENTIFIC RESEARCH UNITS TAKE MANAGEMENT COURSE

Beijing GUANGMING RIBAO in Chinese 2 Feb 80 p 1

[Article by Yang Dabin [2799 1129 2430]: "Research Institute of the Fifth Ministry of Machine Building Runs Course for Management of Scientific Research; Leading Cadres of Scientific Research Units Receive Training, Taking Turns"]

[Text] The research institute of the Fifth Ministry of Machine Building ran a course for management of scientific research, and the leading cadres of various scientific research units took the course, taking turns.

During the course of practice, the leaders of the research institute of the Fifth Ministry of Machine Building discovered that some of the units were not very productive today and their scientific research work developed too slowly. The main reason for the mediocre performance lies in the low level of management standards as well as technology, which are unsuitable for the needs of the four modernizations. Many leading comrades who have never received training in the modern scientific management method found their work difficult. Some comrades expressed the desire to take leave from their work in order to study this subject, but there aren't any appropriate schools which one can attend. Therefore, the party committee of the institute decided last year to run a course for management so that the leading cadres of various research units may take turns to participate.

In order to prepare the course well, they carried out an investigation and researched various problems. Based on the demand made by the superior level, the suggestions made by the masses, and some of the experiences of fraternal units, they drafted the activity plan and the general guideline for the scientific research management course, and invited several scientific research personnel who are well-versed in the subject from various units, including the Chinese Academy of Sciences, the Seventh Ministry of Machine Building, the Electronic Computer Central Station, and this institute to serve as the instructors. They have also printed 10 or more kinds of teaching materials and data.

Those who attended this term of the study class included the main responsible comrade of each institute, and the persons in charge of the various departments of the institute. They dug deep into the core of the problems related to such important matters as the basic responsibilities of each scientific research unit, structure and installation, the responsibilities of the party committee and the director of the institute, and how to expand the right of independence of each institute and dependence on the intelligentsia under the premise of scientific research, by studying the lectures given by the leading comrades of the Party Central Committee, the reports and data written by the experts on systems engineering and electronic computers, and the experiences gained by fraternal units. Afterward, they have collectively drafted tentative rules and regulations for various scientific research units attached to this institute.

After more than a month's study and research, everyone's understanding and awareness of the importance of scientific research have been heightened. They have gained knowledge concerning systems engineering and electronic computers which is indispensable for successful management of scientific research. Practice has proven that the course has had a definite impact on strengthening of scientific management, establishing order in scientific research work, and raising the work efficiency.

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PHYSICAL SCIENCES

THIRTY YEARS OF PROGRESS IN GEOMAGNETISM, AERONOMY

Beijing DIQIUWULI XUEBAO [ACTA GEOPHYSICA SINICA] in Chinese Vol 22 No 4, Oct 79 pp 326-335

[Article by Zhu Gangkun [2612 1511 2492] of the Institute of Geophysics, Chinese Academy of Sciences: "Thirty Years of Progress in Our Country's Geomagnetism and Aeronomy"]

[Text] Abstract

This article presents a relatively systematic account of our country's 30 years of progress in geomagnetism and aeronomy; it is divided into the following 14 topics: (1) Establishment of geomagnetic observatories; (2) Geomagnetic surveys and geomagnetic charts of China; (3) Geomagnetic transient variation and geomagnetic storm prediction; (4) rock magnetism, paleomagnetism and archeomagnetism; (5) Magnetotelluric prospecting and related problems; (6) Development of magnetic exploration and interpretation of data; (7) Research and development of geomagnetic instruments; (8) Search and theoretical study of seismo-magnetic relations; (9) Statistical analyses of solar-terrestial relations; (10) Structure of upper atmosphere and determination of the ozone layer; (11) Ionospheric measurements and analyses; (12) Structure and disturbance of magnetosphere; (13) Studies on cosmic ray time variations; (14) Retrospect and prospect.

Over the past 30 years since the founding of the People's Republic, our country has made tremendous developments in geomagnetism and aeronomy. But the rate of progress is very unbalanced. In overall terms, the development is relatively slow and there is still a great gap as compared with advanced countries around the world. At present, while the whole country is striving to realize the new long march of the "four modernizations," it is very necessary to examine some of the progress made in our country's geomagnetism and aeronomy over the past three decades, and thus summarize our own positive and negative experiences.

1. Construction of Geomagnetic Observatories

Built near Shanghai by a French missionary, the Mount She Observatory was the only one of its kind in our country before liberation. A geomagnetic observatory was set up for a short period of time in Nanjing by the Institute of Physics under the old Central Research Academy; during the early period of the War of Resistance Against Japan, an observatory was set up in Guilin, subsequently moved to Bei Bei of Chongqing, and eventually stopped recording operations. After the liberation, under the overall planning of the Institute of Geophysics of the Chinese Academy of Sciences, and through its active promotion, eight geomagnetic observatory posts were set up: the Beijing Observatory (officially began recording in 1957), Lanzhou Observatory (1959), Mount She Observatory (1877), [sic] Guangzhou Observatory (1957), Changchun Observatory, Lhasa Observatory and Urumqi Observatory. Besides, in order to coordinate with field magnetotelluric measurements, temporary geomagnetic observatories were also built in Dunhuang, Zhiya, etc.

Following the great Xingtai earthquake of 1966, positive efforts were made to coordinate with earthquake forecasting work. With the elaborate support of the Chinese Academy of Sciences and National Seismological Bureau, three key geomagnetic observatories were set up in Longyao's Hong Mountain, Tianjin's Qingguang, etc. In recent years, with the establishment of seismological organizations in various provinces and cities, plus the utilization of all kinds of instruments for magnetic surveying, a total of 141 key observatory posts were set up one after another.

Among the preceding geomagnetic observation posts, the locations of the first eight observatories and the other two observatories which were set up after the Cultural Revolution are all evenly distributed, and constitute the basic geomagnetic observatories for developing geomagnetic science. With the exception of Urumqi, the eight observatories have released official records (1); Mount She Observatory and Beijing Observatory rank highest in quality. Active measures are being taken to improve the other observatories.

2. Geomagnetic Surveys and Geomagnetic Charts of China

Prior to 1936, all magnetotelluric measurements in our country were carried out by foreigners; the operations went on and off for altogether 1,128 point times--see reference material (2). It was not until 13 years prior to liberation when our country finally began to conduct its own magnetotelluric sounding operations along the southeastern coastal area, the banks of the Chang Jiang [Yangtze River], Hainan and Xisha Islands, and the Southwest Region, totalling 127 points. After liberation, under the leadership of the Institute of Geophysics, Chinese Academy of Sciences, relatively great developments were made in magnetotelluric sounding work, which is roughly divided into the following three stages: The first stage lasted from 1950 through 1959, during which a total of 235 point times of measurements were conducted throughout the entire country; the second stage reached the early 1970's, and the scale was relatively large with preliminary extensive surveys, accumulating 1,740 measurement points; the third stage was focused on measuring long-term variation points which were limited to within 100 and mainly conducted in the Xixang region.

The task of producing geomagnetic maps of China was primarily carried out over separate periods of time by the Institute of Geophysics, Chinese Academy of Sciences. Based on geomagnetic data collected in Chinese territory and subsequently unified for universal use, 1950.0, 1960.0 and 1970.0 geomagnetic maps of China were produced. Basically, the maps contained D, I, H, Z contours and their annual variation diagrams which could serve as reference information for national defence as well as the production sector. Among the maps of the three preceding periods, naturally, 1970.0 geomagnetic charts turned out to be the best. This was due to the fact that they were based on data obtained from a relatively large number of stations, plus the fact that they were based on the time variation patterns accumulated from geomagnetic stations in China and 3 in Japan. In addition, the spacial distribution of the stations was more uniform than before. At the same time, a written summary on "Ways of Analyzing the Earth's Basic Magnetic Field" (3) was put out. In the future, attention should also be given to the application of navigational measurements and satellite data, and efforts must be put into theoretical research on long-term variation and ways of unification.

3. Geomagnetic Transient Variations and Forcasting Magnetic Storms

Before liberation, our country never had this type of research work. As the magnetotelluric data accumulated by the Mount She Observatory covered a relatively long period of time, it was suitable for analytical research on transient variations of the geomagnetic field. For this purpose, beginning in 1953, the Insitute of Geophysics of the Chinese Academy of Sciences started the following projects: (1) Statistical analysis of magnetic storms; completed Mount She Observatory's magnetic storm records of 1908-1956. Based on the magnetic storms' characteristics; such as sudden commencement and main phases, the magnetic storms were categorized, and statistics were made on the characteristics of various kinds of magnetic storms which included the variation amplitude of sudden commencements, the intensity of magnetic storms, and the frequency of magnetic storms during the seasons and sunspot cycles. (2) Completed Mount She Observatory's computation of the k-indices ranging from 1922 to 1956, and conducted preliminary statistical analysis. Details of the two preceding projects were recently introduced in reference literature (4). Simple forcasting of magnetic storms have gradually developed in geomagnetic observatories everywhere, and can provide instant information for reference. Besides, the Mount She Observatory has been conducting a series of surveys to determine the diurnal variations of curved magnetic disturbances, magnetic quiet days and magnetic disturbance days, and also to measure geomagnetic tides (5-6).

In the fall of 1958, the problem of "magnetic storms, ionospheric disturbances and ways of forecasting them was brought up. Moreover, on the basis of the "geophysical effects of sun proton explosions" (7), concerned organizations of the Chinese Academy of Sciences began to develop conventional forecasting of solar activities and magnetic storms. Practice has proven that besides relying on effective signals from solar activities as a means of magnetic storm forecasting, it is also important to keep a close watch on the variations in high altitudinal magnetosphere. In order to perfect magnetic storm forecasting and develop it into quantitative work, it is necessary to strive hard for broader and deeper scale (8).

In recent years, departing from the coincidental relations between solar eruptions, planetary shock waves and geomagnetic storms, statistical analyses have been made on the correlation between solar eruptions and geomagnetic storms, and attempts have been made to come up with theoretical explanations (8a, 8b).

4. Rock Magnetism, Paleomagnetism and Archeomagnetism.

As early as 1951-1955, various organizations in our country began to measure the magnetism of rock samplings in coordination with geomagnetic surveys; their primary job was to measure the magnetic susceptibility of rocks. Based on the magnitude and variation of the magnetic susceptibility of rock minerals, it was possible to successfully link up the observed magnetic anomalies and the geological structures of explored areas. For information regarding early period work, please refer to reference literature (9-12). At present, this particular kind of work is primarily focused on geological petroleum and metallurgical sectors. Paleomagnetic surveys and research involve the deduction of terrestrial polar sites in various geological ages, and efforts are being made to determine the shifting of the polar sites, the reversal of the geomagnetic field, earth crustal changes as well as the application of stratigraphy and geotectonics. Early period work: In reference (13), the positions of the paleoterrestrial poles in the Silurian period were determined on the basis of three pieces of samples collected in Gansu; in reference (14), a nondirectional magnetometer was used to measure the natural remanent magnetization intensity of 175 pieces of rock samples; and the paleomagnetic polar positions were thus determined. Gathered from north China, central China and some parts of south-west China, the samples belonged to the following five geological ages: Devonian period, Carboniferous period, Permian period, Triassic period and Jurassic period. Recent period work: In reference (15), the alternating field demagnetization technique was employed in making remanent stability tests of directional sandstone samples of the Xiuming Group of the Lower Sinian Series gathered from Anhui's Xiuming Region, which helped to determine the average remanent magnetization direction and paleomagnetic polar positions. Similarly, in reference (16), paleomagnetic research was conducted in two typical sections of basalts located in nearby Tianjing where the geological ages were still questioned by geologists. In recent years, paleomagnetic surveys were chiefly conducted in the Xizang Plateau where the rock sample test results are still being sorted out. In reference (17), for the first time in Yunnan Province, the Paleomagnetic technique has helped to determine the age of the Yuanmou man fossil which appeared around 1.7 million years ago, earlier than both Beijing man and Lantien man. Our country has a long history of ancient civilization; the utilization of remanent magnetism in antique samples (such as porcelain, bricks, tiles, ancient ruins, etc.) has provided excellent conditions for developing archeomagnetic surveys. In reference (18), 40 pieces of ancient brick samples from the Han, Three Kingdoms, Tang, Song, Jin, Yuan, Ming and Qing Dynasties were collected and processed into 427 pieces of cubic samples, and the samples were subjected to remanent magnetism tests and gradual heating research, which enabled the preliminary determination of the magnetic dip, geomagnetic field intensity and their variations over the past 2,000 years in the Beijing region. There is no doubt that such archeomagnetic surveys as the one conducted in Beijing region can be easily popularized and applied in the study of antique sample of other ancient cities. It is anticipated that (more) findings will be published in the not-too-distant future.

5. Magnetotelluric Prospecting and Related Work

In the early post liberation years, our country used to stress the application of self-potential field method (19-21) in prospecting for oil and gas formations and such minerals as sulfides. Also, some scholars in our country published a series of papers, such as those cited in reference literature (22-31), explaining about all kinds of elliptic potential fields, data processing in the use of the telluric method, and the positive deduction of fault layers.

Developed from the telluric method, the magnetotelluric depth probing technique was extensively used in our country around the late 1960's and 1970's. Reference literature (32) mainly introduces the simultaneous recording of magnetotelluric disturbances with periods ranging from a few seconds to several thousand seconds in an area stretching from Gansu's Wudu to Yingchuan in the Autonomous Region of Ningxia. Based on the observation results, it was possible to analyze the electric conductivity characteristics of the earth crust and upper mantle as well as the difference in electric property between seismic active and non active areas located in the northern portion of the North-South earthquake belt of China. In recent years, concerned organizations continued to use the magnetotelluric depth probing method to study the electric property structure of certain crusts in Xizang, and the results will be published. Besides, in reference literature (33), surveys on the conductivity anomaly along the west coast of Bohai Gulf were carried out by utilizing data on bays and sudden magnetic storms occurring to the three factors as recorded by four geomagnetic observatories in Beijing, Changli, Tianjing and Dalian; but in reference literature (34), emphasis was placed on recording and analyzing the relations between 1-200 minute short period geomagnetic variation anomaly and earthquakes occurring in the eastern part of Gansu where six observatories were stationed. Reference literature (35) gives a preliminary summary of the basic principles involved in magnetotelluric prospecting.

6. Magnetic Prospecting and Interpretation of Data

The production sector has always attached much importance to ground magnetic surveys and aeromagnetic surveys. The strongest point of the latter lies in its ability to obtain a large scale geological picture of a large area within an extremely short span of time. Ours is a country with many mountains which account for nearly two-thirds of the total area. Through extensive practical use, the aeromagnetic survey method has also undergone some new developments. As described in reference literature (36), back in 1966, there were discussions on problems which occurred in the research on the use of ground magnetic method for metallic mineral exploration. Reference literature (37-41) focuses mainly on the quantitative interpretation of magnetic anomalies. In the past 10-odd years, magnetic prospecting and data interpretation developed mainly in the production sector. With the application of earth resource satellite pictures, plus the American satellite Magsat which is scheduled to be launched around this September, there is no doubt that there is a great future for the discovery and interpretation of large tract magnetic anomaly.

7. Research and Development of Geomagnetic Instruments

After the liberation, tremendous progress has been made in the development of geomagnetic instruments in our country. The Geological Instrument Plant has produced WCWI-63 nondirectional magnetometers, CHD5-72 ground nuclear precession magnetometers, CCM-1 fluxgate magnetometers, CCK-1 digital airborne fluxgate magnetometers, and various kinds of resistivity surveying instruments, etc. Besides, the Anhui Liu'an Prefecture Radio Plant recently produced the QHXC-75 component nuclear precession magnetometer. The Institute of Geophysics of the Chinese Academy of Sciences developed the CB_2 3-component geomagnetic recorder and CJ_6 geomagnetic theodolite, but there is still room for improvement.

In order to unify the standards for data collection by observation posts throughout the country as well as field surveys, continuous efforts have been made to determine and compare the absolute constant values of surveying instruments which are mainly based on the Beijing Observatory and Mount She Observatory. Moreover, some work has been done in improving geomagnetic surveying techniques as well as instrument accuracy, as described in reference literature (42-46). Two types of instruments, i.e., QHM and BMZ, have been used for comparing the instrument constant values of various observatories during the International Geophysical Year and also in recent years. The latter is described in reference literature (47a).

8. Search of Seisom-magnetic Relations and Theoretical Research

To meet the needs of earthquake forecasting, efforts have been made in the past decade to explore and study the seismo-magnetic relations. One feature lies in the development of magnetic surveys and forcasting experiments conducted by rank-and-file workers, such as the "magnetic storm 2-multiplier method," "red and green light method," "magnetic storm 9-multiplier method," etc. However, they lack proper mechanism and models, which makes it difficult to produce effective results in practice. Professional probing and research have received adequate attention. With regard to the utilization of the diurnal variations in the geomagnetic field's morphology, reference literature (48) presents two kinds of methods for analytical work: "space correlation" and "phenomena correlation," and expounds on the application of space correlation in earthquake prediction. Reference literature (49) presents the concept of maximum time correlation, and gives a preliminary analysis of phase relations between the daily variations of the vertical component of the geomagnetic field at two stations. With regard to the diurnal variations of the geomagnetic field, based on (the work of) predecessors, reference literature (50-51) introduces a method for analyzing the diurnal variations of local geomagnetic fields, and discusses the separation theory of local geomagnetic field. At present, there are several interpretations in our country regarding the possible mechanism of seismo-magnetic relations. Departing from the diffusion equation derived from Maxwell's equation reference literature (52) presents a basic equation for common 3-D electromagnetic inductances, as well as its bordering conditions and solution. Based on the seismic and geomagnetic variations observed in China's Xintai earthquake region, reference literature (53) suggests that it is very difficult to interpret seismo-magnetic relations by means of the piezo-magnetic effect; thus, similar to the seismic "dilatancy" theory, it suggests that geomagnetic variations could be caused by micro-fracture and dilatancy, and fluid diffusion processes in rock medium at the earthquake source. Bur reference literature (53a) points out that the "dilatancy" magnetic effect is very small. Based on the theory of magnetic elastic wave, reference literature (54) suggests that geomagnetic disturbances accompany seismic wave propagation. Under ideal conditions in which electric conductivity $\sigma \to \infty$, the magnitude of variation in the magnetic field near the earthquake source amounts to approximately a few gammas; this type of magnetic disturbance does exist under limited conductivity conditions. Reference literature (55) presents the calculation of electromagnetic response of conducting sphere with time-varying conductivity, and attempts to relate the occurrence of certain forms of "electromagnetic premonition" prior to strong earthquakes to one of the possible "forewarning mechanisms." For other aspects of seismo-magnetic relations, see also reference literature (32-34). Reference literature (56) briefly introduces the international seminar on new developments in tectonic magnetism which was convened in Paris in 1975.

9. Statistical Analyses of Solar-Terrestrial Relations

In the early stage, research work on solar-terrestrial relations was focused mainly on phenomenological statistical analyses which will be briefly described here. In recent years, the development of solar-terrestrial physics was concentrated in the study of the magnetosphere and aeronomy, which will be reviewed in other parts of this paper. Reference literature (58, 61-63) analyzes the relations between solar flares and magnetic storms, and asymmetrical relations between the sundial position of solar flares and magnetic disturbances; in addition, it presents an analysis of the geomagnetic effect of large solar flares in solar r and Br sunspot magnetic field area during 1938-1958. Reference literature (57) gives a statistical analysis on the diurnal mean values of the geomagnetic horizontal intensity and heavy magnetic storms on magnetically disturbed days during 1923-1954, thus showing a 27-day periodicity; reference literature (59) presents an analysis of its relations to k_p by making use of 5303Å data in the coronal green area recorded during 1909-1952 by America's Climax Observatory. Reference literature (60) presents the relations between spectral spots and reoccurring magnetic storms during 1942-1943, and 1952-1953, thus estimating the solar wind mean speed at 300-500 kilometers per second. Reference literature (64-65) cites two examples dealing with the relation between solar eclipses and the upper atmosphere, and it focuses mainly on the influence of the migration of the sun's ultraviolet radiation on the zone layer. Using the 1955 edition of the Greenwich catalog of great magnetic storms, reference literature (66) analyzes the daily temperature changes in our country recorded by nine stations from 1909 through 1952.

10. Structure of the Upper Atmosphere and Determination of Ozone Layer.

Our country still has not accumulated any systematic data for determining the upper atmospheric ozone layer. It was not until recently that thanks to the international correction of the Dobson ozone spectophotometer, plans have been made to build two stations in Beijing and southwest China. Reference literature (67-70) discusses the application and improvement of the reversal method used for measuring the vertical distribution of ozones in the atmosphere. In the research on the structure of the upper atmosphere, relatively great developments have been made both in direct measurements and theoretical analysis. The direct measurements are mainly applied at altitudes below 100 kilometers where meteorological or sounding rockets are used for measuring the temperature, pressure and wind. The high altitudes are measured by orbiting satellites which enable the calculation of the density of the upper atmospheric as well as parameters of the earth's gravitational field (71-73). In the research on the model of the upper atmosphere, reference literature (74-76) discusses the dynamic transmission and turbulent structure of the mesosphere and thermosphere, and their influences on the altitudinal distribution of chemical components. With regard to the theoretical explanation of such problems as the structure and dynamics of the upper atmosphere, a set of new functions (Green's functions) of the thermosphere is derived and discussed in reference literature (77, 77a) which also expounds on the 3-dimensional stratified model, a differential operator of thermospheric tides and its eigenfunctions, and diffusion waves of the upper atmosphere. Reference literature (78-82) presents an analysis and discussion on two problems: First, it analyzes the influence of solar radiation and other heat sources on the thermosphere, disucsses the relations between diffusion and higher atmospheric waves, comes up with an explanation regarding the diffusive equilibrium under the impact of the electromagnetic field and gravitational field, and deals with the distribution of ion components at 500-50,000 kilometers. Second, it analyzes the process of radiation absorption transmission and heat equilibrium in the upper atmospheres of plants, discusses the influences of early period condensation, radiation, atmospheric escape and greenhouse effect on planetary atmosphere and surface heat status; and expounding on the origin of the atmospheres of the earth and other planets, it suggests that the earth had undergone the primary stage of primordial atmosphere which was characterized by chemically reducing gases rich in hydrogen and its compounds. During the International Geophysical Year, our country imported complete sets of nightglow observation instruments; but owing to system and personnel changes, plus the uncertainty as to where to place the observation site, up to now the instruments have never been put to use. In the theoretical study of airglows, reference literature (83) presents a data analysis of the half width of the oxygen green line's height profile, and examines recent data on the height profile of atomic oxygen. Inclined towards the excitation mechanism (theory), the paper favors the 2-stage reaction argument instead of the 3-stage reaction suggested by Professor S. Chapman. Disregarding radiative transition and absorption, reference literature (84) first computes the electron excitation rate of ground-state medium energy levels of oxygen atoms, which is based on the electron collision and excitation section. Also, through certain hypotheses on the total collision and excitation section of neutral particles, it comes up with corresponding excitation rates. On this basis, the paper computes the excitation temperature of the ground-state medium sublevels of oxygen atoms between 140-500 kilometers.

11. Ionospheric Measurements and Analyses

As short wave radio communication is closely linked to the ionosphere, our country has long stressed the importance of measuring and studying the ionosphere, which, in particular, was strengthened during the International Geophysical Year (IGY). At present, besides one or two observation stations, most of the ionospheric frequency-altitude measurements in our country are manually controlled. But there is also a relatively large number of stations which are relatively well distributed and have accumulated primary data covering a long period of time. The Institute of Electric Wave Propagation in our country has developed automatic ionospheric altimeters which are being installed in various stations. In addition, efforts are being made to speed up the frequency-altitude conversion work and plot standard graphs. Reference literature (85a) describes the early stage of ionospheric survey research. In recent years, the Physics Department of Wuhan University has successfully designed and assembled an automatic oblique return ionosonde; the Institute of Space Physics recently developed the 505A-type Polarimeter used for studying the electronic content of the ionosphere, and has already put it to reception tests (85).

In the early period, our country also conducted analytical study of the ionosphere (86-89). Reference literature (86) and (87) present the intersection point correlation method and 10-point correlation method, used for analyzing the statistical features of secondary waves vertically reflected from the ionosphere. Reference literature (88) and (89) analyze the sunrise effect in the ionosphere's E layer and F layer, and proves that D. F. Martyn's drift theory is not adequate to interpretate the anomalies of F_2 layer. The 1977 and 1979 academic seminars concentrated mainly on theses dealing with the ionosphere, thus showing the progresses made over the recent years, which may be roughly divided into the following four areas: First, processing of vertical sounding data and the conversion of ionospheric electron density cross section structure (90-94). Second, ionospheric frequency prediction; characteristics of the regular ionosphere and Es signal channel; as well as the refraction effect of the ionosphere (95-99). Third, analysis of certain characteristics of the low ionosphere and ionospheric disturbances in certain areas of our country (100-104). Fourth, reference literature (105-111) which includes whistling and other means of computing the parameters of the ionosphere; the integrating effect of Doppler frequency shift caused by the refraction of high frequency electric waves by the ionosphere; and the effects of the milky way's cosmic rays on the ionosphere; as well as the interaction between electric waves, antennas and ions, etc.

12. Structure and Disturbance of the Magnetosphere

Theoretical analysis was stressed in early period work. Reference literature (112-114) deals with the structural changes in the outer radiation belt and discusses a kind of mechanism which electrically charged particles have as they pass through the geomagnetic field. Reference literature (115-116) deals mainly with the qualitative estimation of sudden eruptive magnetic storms, assymetric longitude of the magnetic storm's main phase. Reference literature (117-119) analyzes the motion of electrically charged particles in the geomagnetic field and neutral line magnetic field, and strongly suggests assimilative experimentation. Reference literature (120-121) summarizes the propagation of magnetic fluid shock waves in heterogeneous magnetic fields, and computes the solar flare shock waves near the earth orbit on the basis of the Forbush decrease in cosmic rays. The launching of our country's artificial satellites has helped to create favorable conditions for exploring spatial particles and magnetic fields, which is described in specific examples presented in reference literature (122-124). At the 1979 Solar-Terrestrial Physics Academic Symposium, such topics as solar eruption, solar wind, magnetospheric substorms, etc. were dealt with at length, espeically the substorm mechanism of the magnetosphere (125-127). Reference literature (128-129) presents theoretical models of satellite surfaces charged with electricity, and reference literature (130-131) discusses the magnetic coordinates of magnetic fields.

13. Cosmic Ray Intensity Variation Determination and Research

During the International Geophysical Year, out country set up observation stations in Beijing, Guangzhou and Yuunan's Luoxue; but, at present, the Beijing station is the only one which maintains routine observations with its neutron reactor, ionization chamber and M-meson telescope, while the other three stations ceased operations shortly after the IGY. The early period recording work turned out to be quite satisfactory; for example, reference literature (132) discusses the barometric correction of cosmic ray meson components in Beijing and Luoxue. However, in recent years, owing to various reasons, a great deal of rectification and restoration have to be done in the maintenance of regular observation and analytical work. A series of articles on solar cosmic ray propagation work have been put out. Reference literature (133-135) discusses solar cosmic ray propagation in interstellar space, including the physical processes of diffusion in irregular interstellar magnetic fields and solar wind convection, in which dimensionless parameters were introduced to reflect particle diffusion and convection characteristics, thus solving the equations for diffusion and convection in uniform boundless media, and an attempt is made to apply it in the propagation correction of energy spectrum in solar proton events. Based on large dimensional fan-shape magnetic fields in interstellar space, reference literature (136-138) established a fairly rational fan-shape coordinates system for studying solar cosmic ray propagation in interstellar space, thus deriving an equation for the propagation of solar cosmic ray in this particular kind of coordinates system. Subsequently, the fan column coordinates system was used in the discussion on the propagation of Jupiter's electrons in interstellar space, and modulations in the earth's orbit; and a 3-D diffusion mode of solar cosmic ray propagation was established. Reference literature (134) deals with cosmic rays intensity variations.

14. Brief Review and Forecast

From above, it is evident that achievements have been made in the development of our country's geomagnetism and aeronomy over the past three decades, which has played a certain role in our national economy as well as national defence build up. The developments were facilitated on the one hand by the promotion of science by specific tasks and of specific tasks by science, and, on the other, by long-range planning and annual planning of scientific and technological developments which have continousuly received due support. But there are also quite a few problems: the speed of development is slow, and the growth of personnel is not fast enough. Only four or five academic seminars in this area have been organized over the past 30 years (the first one was held in February 1977, the second in September 1963, the third in September 1976, and the fourth in February 1979; in addition, there was another symposium in November 1977, but it was on ionospheric physics only). As far as academic journals are concerned, articles on geomagnetism and aeronomy accounted for only a small proportion, and could not meet the needs of the "four modernizations." Besides, the development of the various branch sciences of geophysics is not balanced; in the 1950's, more emphasis was laid on exploratory geophysics, meteorology and seismology. During the International Geophysical Year and the early 1960's, there were some developments in geomagnetism and aeronomy. During the Cultural Revolution, all natural sciences, including geophysics, fell under the impact of the extreme "leftist" ideological tide. In recent years, remarkable advances have been made in exploratory geophysics, meteorology, and especially seismology. In contradistinction, unified understanding has yet to be achieved and specific measures have to be taken before geomagnetism and aeronomy can be developed at locomotive speed and really catch up.

At present, as compared with the international advanced level, quite a gap still exists in the following three aspects: basic construction, application of advanced technology, and the development of advanced and unique theories. Take the International Magnetosphere Study (IMS) for example, the IMS has grown vigorously; in 1976-1979, it developed comprehensive observations ranging from terrestrial surface to space observations on global scale; 1980-1981 was characterized by data processing and analysis, and in-depth research as well. But our country has just begun, and it has yet to reorganize all surface observation projects developed since the IGY. Furthermore, it has yet to develop the application of new IMS equipment in a planned way, and there is need for in-depth investigation and research on introducing foreign technologies to our country. In addition, steps have to be taken to actively develop research on the magnetosphere and solar-terrestrial relations (140). In the future, emphasis must be placed on maintaining relatively stable systems and specializations in basic construction. Efforts must be made in speeding up the training of personnel and swiftly fill in the gaps in our country. Attention must be given to the quality of data gathered by observation stations, and high-speed computerized processing must be developed. While absorbing advanced technologies, it is important to keep in line with the actual conditions in our country, and emphasize economic results. For example, in developing space technology and exploration, it is advisable to concentrate our efforts mainly on nearby objects and small-scale developments, characteristics should be stressed; learning and creating should be combined; and we should also concentrate on greatly tapping resources on the earth's surface. In theoretical research, we should try to use physical and mathematical theories for probing into the mechanisms of geomagnetic and aeronomic phenomena and processes; new and modern techniques should be employed; the exploration of the macroscopic laws of natural changes should be conducted on the basis of understanding microscopic process. Moreover, we must pay attention to the interdisciplinary diffusion of various sciences; extensively develop all types of academic activities, strengthen exchanges with other countries. On the basis of continuously liberating the mind, and by actively coordinating our efforts, we must strive hard to blaze new trails in the realm of science on a broader scale.

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Mar 79

[Edited by Wuhan Water Transport Engineering Institute]

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NEW ACHIEVEMENTS IN OCEAN INVESTIGATION, RESEARCH NOTED

Beijing GUANGMING RIBAO in Chinese 29 Jan 80 p 2

[Article by Liu Shulin [0491 2579 2651]: "New Achievements in China's Ocean Investigation and Research"]

[Text] The vast majority of the members of National Ocean Bureau gained new achievements last year in works related to ocean investigation and research.

In 1979, two research ships--"Shijian" and "Xiangyanghong 09"--have worked continuously for more than 180 days and nights in the wide expanse of the Pacific Ocean, and accomplished victoriously the tasks of the first world-wide atmospheric experiment and observation at sea, and received praise from the World Meteorological Organization of the United Nations. Research ships "Xiangyanghong 5" and Xiangyanghong 12" and their scientific and technical crews have successfully completed investigation of a certain designated ocean area and compiled their general investigation results and written their scientific and technical reports as well as the classified reports according to each specialty. They have thus contributed significantly to the research work related to the development and utilization of the ocean by providing the valuable scientific data. The scientific and technical members engaged in the ocean environmental protection work have, with enthusiastic cooperation from the coastal provinces and cities, unfolded investigation of pollution of the local ocean along the coastline, and upon this foundation, they have continued to carry out the surveillance and measurement of the ocean pollution. In Bohai, they have completed establishment of a preliminary pollution surveillance network, and begun to issue annoucements related to the results of pollution surveillance to the concerned departments. At the same time, they have, with the cooperation of 22 other units, compiled a book entitled "Tentative Rules on Ocean Pollution Investigation" in order to standardize the method of investigation and to improve the quality of the investigative work.

The vast majority of scientific and technical personnel fighting gallantly at various ocean stations on the offshore islands have, in addition to carrying out their daily routine tasks of observation and surveillance, unfolded works related to forecasting of storms and tides, analysis of typhoon paths, and supplementary weather forecasting. The general ocean forecasting station strived to improve its method of forecasting, and significantly improved the accuracy of forecasts, including the short-range weather forecast in the ocean adjacent to as well as at a medium distance from the shore, together with forecasts of typhoons, cold air fronts, and cyclones.

The personnel engaged in making various instruments for the ocean study have also reaped new achievements. Large-scale electrical osmosis sea water desalinating equipment specially designed to be used at the Xisha Archipelago has, since its installation and test run, operated normally and satisfied all the basic design requirements.

In order to help develop the ocean enterprises, the vast majority of those involved in science and technology have enthusiastically written popular books on the subject of ocean science and organized various oceanographic data. The members of the general oceanographic hydrology and meteorological station have compiled and published the first "Almanac of Typhoons, Waves, and Tides" which has ever appeared in this country. The members of the oceanographic technical informatien center have for the first time compiled an "Ocean Tide Table" for the 24 important harbors, straits, and waterways in the Pacific and Indian oceans. The table, which contains the predicted values of high and low tides, the ocean current table, and the tidal prediction constants, is fast becoming one of the most important reference materials for ocean study and ocean voyages.

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'RENMIN RIBAO' ON DEVELOPMENT OF TRADITIONAL MEDICINE

Traditional Medicine Development

OW271530 Beijing XINHUA in English 1523 GMT 27 Mar 80 OW

[Text] Beijing, March 27 (XINHUA)--The PEOPLE'S DAILY in an editorial today urges medical scientists to retain the essential value of China's long history of medical research and draw on the experience of veteran traditional doctors.

It calls for the training of doctors and pharmacists in traditional medicine as well as modern medical skills. The paper also urges the use of modern technology to study the laws governing the development of traditional medicine and research its mechanism in treating and preventing diseases.

Today's editorial is a commentary on the recent national conference held in Beijing on traditional medicine and its integration with modern medicine.

The article, entitled "Firmly Implement the Party's Policy for the Development of Traditional Chinese Medicine," outlines the Chinese Communist Party's policy on traditional medicine.

Among the main points are: carry on, investigate and improve the science; rely on practitioners of traditional medicine to develop it; work for the integration of traditional and modern medicine and encourage doctors of modern medicine to learn traditional techniques; work for the gradual modernisation of traditional medicine.

The PEOPLE'S DAILY says that the medical practices of Tibetan, Mongolian and Uygur people should be included in the research into traditional medicine.

Doctor on Traditional Medicine

OW280846 Beijing XINHUA in English 0832 GMT 28 Mar 80 OW

[Text] Beijing, March 28 (XINHUA)--To treat the body as a whole, not merely the diseased part of the body, to encourage prevention of illness, to regulate the diet and make use of physiotherapy--these are some of the outstanding features of China's traditional medicine, commented Dr. Ma Haide (George Hatem), who was interviewed by XINHUA at a recent conference in Beijing.

The conference was held to work out plans for the future development of medicine in China and to promote integration of traditional and modern medicine.

"It is a real treasure house of knowledge to be studied by modern science," said Dr. Ma who came to China from the United States in 1933, and is now an adviser to the Ministry of Public Health.

Dr. Ma favours the integration of traditional Chinese and modern Western medicine. "Attempts to integrate traditional Chinese and modern Western medicine have produced promising initial results and offer a new approach to research in many branches of science," he noted.

Because of the relative isolation of China from other cultures until modern times, Dr. Ma said, Chinese medicine developed largely independently of outside influences, while medical knowledge elsewhere gradually coalesced to form the basis of modern Western medicine. As late as the time of the great pharmacologist Li Shizhen (1518-1593), however, Chinese herbal medicine was probably the most advanced system of herbal medicine in the world. The custom of Chinese scholars and historians to keep detailed records and make observations of natural phenomena, probably contributed to the growth and development of this body of knowledge.

However, Dr. Ma noted that under the rule of Chiang Kai-shek, before liberation, the Kuomintang had forced practitioners of traditional medicine to take examinations in Western medical knowledge in order to discredit them and prevent them from practicing.

After liberation, the people's government had taken steps to develop traditional Chinese medicine and called for unity among practitioners of traditional and modern medicine, thereby paving the way for a greater measure of cooperation and cross-fertilization between the two schools. In this respect, he said, the use of acupuncture anaesthesia in the performance of surgical operations was the example of integration best-known in the outside world. This had given rise to further research in neurology, neurophysiology and neurochemistry, and this research was continuing.

Traditional medicine has also been used in conjunction with modern methods of treatment in cases of patients with acute abdominal conditions, in the treatment of kidney stones and gallstones, certain branches of orthopaedics and in numerous chronic cases. Doctors of modern medicine are encouraged to study traditional medicine. In many instances 'traditional' and 'modern' doctors work side by side and benefit from the expertise of one another. "The recent meeting promoted further the plans for organised efforts in traditional and modern basic medical research," Dr. Ma pointed out.

Dr. Ma Haide began his medical work in China among the factory people in the 1930's in Shanghai and later worked in Yanan, the communist held base area. He has been recently honoured by the Ministry of Public Health along with Dr. H. Miller and Dr. R. Frey, two colleagues who have, like him, worked in China for more than 40 years.

CSO: 4020

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ORG: All of Institute of Surveying, Chinese Academy of Architecture

TITLE: "Macro Mechanism of Earthquake Liquefaction and Its Damaging Effects"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 1-6

ABSTRACT: Due to the existence of many variable factors, assessment of soil liquefaction often does not produce satisfactory results. This paper reports the search for a new method. Through aerial photos, the macro mechanism of earthquake liquefaction and its damaging effects are analyzed and determined. The topography of the earthquake region and the micro-topographical characteristics have thus been discovered to have large influences on the macrotraces of liquefaction of an area and the characteristics of ground surface damage. When this principle is combined with on-site evaluation of the soil, more accurate estimates of liquefaction become possible and an important basis may be provided for reasonable selection of earthquake resistance designing and the general arrangement of engineering structures of the ground surface.

AUTHOR: XU Yaoting [1776 5069 1694]
ZHANG Hongsheng [1728 3163 3932]

ORG: Both of Institute of Engineering Mechanics, Chinese Academy of Sciences

TITLE: "An Investigation of the Scale for Dividing Small Earthquake Regions"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 7-10

ABSTRACT: In view of the fact that the upper layer of soil has a greater effect on earthquake damage than the lower layers, the area of an inverted triangle is used for averaging the effects of soils of different depths on the composite shear strength, $G_j \times 10^3$ tons/m^2; where G_j is the composite shear strength of the jth drill hole. For the purpose of supporting the reconstruction of Tangshan, this technique was used in 1977 by the Institute of Engineering Mechanics Chinese Academy of Sciences and the Institute of Surveying Chinese Academy of Architecture to proceed with small area classification of Fengrun, which is a northern suburb of Tangshan. The result basically agrees with the classification data of engineering geology.

AUTHOR: ZHENG Jinan [6774 6855 1344]

ORG: Shanghai Survey Academy

TITLE: "Application of Discriminatory Analysis in Handling Expansive Soil of a Building Site"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 11-15

ABSTRACT: In the southern part of Jiangsu Province, the condition of expansive soil often occurs in localized section of a building site. Due to the fact that there is no principle of distribution nor geological data with respect to this type of expansive soil, it is easily mistaken for ordinary clay in the engineering geology surveying process. For example, in the area of the 9424 Plant in Nanjing, the strata are normally clay and attention was not given to identifying expansive soil. As a result, serious cracks occurred to the buildings of the family dwelling section of the plant. Using the soil specimens of that site as the example, this paper demonstrates the method of using mathematical equations to establish discriminant functions for identifying areas of expansive soils.

AUTHOR: GU Baohe [7357 1405 0735]

ORG: Institute of Surveying, Chinese Academy of Architecture

TITLE: "Electronic Computer Program for Engineering Geology Indices Statistics"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 16-17

ABSTRACT: When the data collected from engineering geology surveying are being processed, the physical mechanical indices of each layer of soil must be computed statistically before a geological evaluation of the site and the foundation may be produced. This is a complex and time consuming job, and mistakes can be made easily. This paper introduces an electronic computer program in the FORTRAN language suitable for the purpose of computing the statistical indices of physical properties of the soil samples. a block diagram of the program is given.

AUTHOR: SUN Jiafu [1327 1367 4395]

ORG: Guizhou Provincial Academy of Architectural Designing

TITLE: "Several Viewpoints Concerning Computation of the Depth of the Compression Layer of a Foundation"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 18-20

ABSTRACT: For designing the foundation of a construction site, calculation of the depth of the compression layer is indispensable. It also provides the basis for determining the depth of the test drill holes. In the process of utilizing the document REGULATION FOR DESIGNING INDUSTRIAL AND CIVILIAN BUILDING FOUNDATIONS, TJ7-74, the author discovered certain imperfections in the regulation. The author found the 1 m requirement of the regulation to be unrealistic and therefore unreasonable, because the length and width of the foundation are not taken into consideration while the average pressure coefficient varies with the shape, or the length and width, of the foundation. The author proposes to substitute $\mu B'$m above the calculated thickness of the compression layer for the 1 m above that layer of the existing regulation. The paper demonstrates that the average pressure coefficient varies with the length A and the width B of the foundation and hence the force of settlement also varies.

AUTHOR: HAO Chunyuan [6787 2504 0337]

ORG: Hebei College of Engineering

TITLE: "Concerning Experimental Research on Temperature Compensation of Static Touch Detector Head"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 20-21, 24

ABSTRACT: Based upon the experience of several years of use of the static force touch detector, the author and colleagues have come to the conclusion that if the detector head is made according to the current regulation, the temperature compensation result is very poor and the test precision is directly affected. In the paper, a new designing formula of the key component, the pickup, of the detector head is proposed. Experimental data of temperature strain of the regulation detector head and the newly designed detector head are compared to demonstrate the better temperature compensation effect of the newly designed type detector head.

AUTHOR: XU Ronghua [1776 2837 5478]

ORG: First Academy of Navigation Engineering Design, Ministry of Transportation

TITLE: "Preliminary Experiment on Detector Head Temperature Compensation"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEY] in Chinese No 1, 22 Jan 80 pp 22-23, 16

ABSTRACT: For the purpose of resolving the problem of zero drift in the automatic recorder of the static force touch detector caused by variations of temperature of the detector head, the author carried out some preliminary experiments with adjusting the position of the resistance wire and the composition of the glue with which the wire is attached to the cylinder. Results of several experiments are reported.

AUTHOR: CHEN Rongguan [7115 2837 4619]

ORG: Shanxi Provincial Hydrological Engineering Geology Surveying Brigade

TITLE: "Brief Introduction of the Automatic Brake Frame for the Static Force Touch Probing Shaft"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 24-25

ABSTRACT: An automatic brake frame is added to the probing shaft of the SHK-30 liquid pressure static force probing machine which is an experimental product of the brigade. The function of the brake frame is to lock the probing shaft in place to allow the detector head to be pressured into the stratum. The brake frame is designed according to the theory of the gate interlock structure. A photo of the automatic brake frame and diagrams depicting the various functional parts of the braking system are included in the paper to explain the design and efficiency of this machinery.

AUTHOR: LONG Dengdi [7893 4098 1717]

ORG: Northeast Academy of Electrical Design

TITLE: "Brief Introduction of a Light Weight and Convenient Triaxial Shear Meter"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 26-28

ABSTRACT: A triaxial shear meter can relatively accurately determine the shear resistance of the soil, the lateral pressure coefficient of the soil, the pressure of crevice water, etc. The existing triaxial shear meter can only be used in the laboratory, however. The instrument has many parts and requires a large quantity of soil samples while the soil sample drilling is unavoidably limited by the ground water table. Moreover, the original instrument owned by the academy uses mercury for pressure compensation. In case of breakage, mercury is harmful to the environment and human health. In order to resolve these problems the author and colleagues have made a liquid pressure piston to replace the mercury constant pressure device for the original shear meter. They also made a light and portable shear meter suitable of being used on site. The structure of the small instrument, its special characteristics, and the condition of its experimental application are described.

AUTHOR: YU Xuchu [0205 2485 0443]

ORG: Second Surveying Team, Anhui Provincial Bureau of Water Conservancy Designing Academy

TITLE: "Brief Introduction of Automatic Lift Drill Support and Nonstop Reversing Device for the XJ-100 Drill Machine"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 29-30

ABSTRACT: Originally 8-9 persons are required to place the XJ-100 drill machine in a standing position in the drill frame and sometimes accidents occur during this labor intensive procedure. The author and colleagues designed and made a T-shaped pulley device to realize automatic lifting and dropping of the drill frame. Another device was designed and added to enable the drill shaft to be reversed without stopping the motor. Diagrams depicting the structure of these devices are included.

AUTHOR: LU Xueshi [7120 1331 2535]

ORG: Hubei Comprehensive Surveying Academy

TITLE: "Progress and Comparison of Precision Alignment Surveying Methods of Foreign Countries"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 31-38

ABSTRACT: This paper reports an experiment carried out by the Canadian University of New Brunswick in the summer of 1975 in the vicinity of Fredericton to compare several alignment surveying methods under different atmospheric conditions. In the second part of the paper, experiments using 4 different methods of alignment surveying carried out in China are reported. The latter experiments were carried out for the purpose of establishing a system for monitoring the horizontal displacement of the major dam of the Gezhou Water Conservancy Headquarters. Results demonstrate that the major obstacle to precision alignment at the present stage of development of the technology is the influence of atmospheric diffraction and an ultimate solution of the problem depends upon the advancement of laser technology.

AUTHOR: None

ORG: (1) Changzhou Second Electronic Instrument Plant and Institute of Surveying Technology, Chinese Academy of Architecture; (2) Beijing Surveying and Drawing Instrument Plant

TITLE: "Introducing Two New Surveying and Drawing Instruments"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 39-42

ABSTRACT: In Sep 79 a surveying and drawing instrument standardization conference was held in Changzhou under the auspices of the state's Construction Committee Designing Bureau. Based upon the principle of selecting the superior items for large scale production, 7 items were extensively evaluated at the conference. Of these, the following two were regarded as relatively more advanced as well as reasonable: (1) DCH-03 Phase Type Infrared Photoelectric Telemeter; (2) DS_3 Automatic Adjusting Level. In 2 separate sections, the properties, the technical indices, the basic theory, and the application of the 2 instruments, made by the respective organizations, are described in the paper.

AUTHOR: WANG Lixiang [3769 0448 3276]

ORG: Surveying Office, Wuhan City Urban Planning and Management Bureau

TITLE: "Calculation of Side Convergence Points and the Precision of the Position of the Points"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 43-46

ABSTRACT: This paper introduces equations for calculating points of side convergence and the precision of point positions. Based upon results of electronic computer computation results, the degree of precision of the position of the points is analysed.

AUTHOR: ZHANG Muliang [1728 1970 5328]
REN Quan [0117 5425]

ORG: East China College of Water Conservancy

TITLE: "Repeat Observation Surveying of Linear Lead Lines for Error Correction"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 47-49

ABSTRACT: At present, with a majority of dams in China, the line of collimation method is adopted to observe the horizontal displacement of the apical part. With regard to curved dams, it is necessary to arrange several lines of collimation or to adopt the frontal convergence technique to observe the displacement, involving a considerable amount of work. This paper discusses the method of arranging lead lines in the gallery of an arched dam for observing its horizontal displacement. As the lead lines are distributed in the gallery, they are not influenced by the weather to cause the method suitable for regions of extremely cold climate. The method of computing horizontal displacement introduced in this paper has been experimentally used by related organizations and found to be simple and convenient.

AUTHOR: CHEN Fushan [7115 4395 1472]

ORG: Chongqing College of Civil Engineering

TITLE: "Another Strict Error Correction Method for Dual Base Line Ground Trapeziums"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 50-53

ABSTRACT: In view of the fact that the dual base line ground trapezium is one of the common figures used in triangulation of bridges and the majority of textbooks of ordinary surveying do not contain a method of its error correction, the author introduces in the paper a simple and fast method of its error correction. A group of equations are derived. Using these equations, the result of computation agrees with the traditional method of strict error correction but the author's method has the advantage of being easier to master by those whose specialty is not surveying.

AUTHOR: JIN Sidao [6855 0843 6670]

ORG: None

TITLE: "Use of Isosceles Triangle for One Observation Point Distance Measurement"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 p 54

ABSTRACT: In surveying work, in order to resolve $\triangle ABC$, the minimum requirement is to measure one side BC and the 2 angles of $\angle B$ and $\angle C$; therefore, the transit must be positioned twice. Based upon the condition of the terrain and requirements of the project, the author suggests a method of using isosceles triangle, i.e. extending the triangle ($\triangle ABC$) to cause it to become an isosceles triangle APC, for one-observation-point telemetry. This simplifying method is explained.

AUTHOR: LIU Ruiqi [0491 3843 3825]

ORG: Institute of Surveying Technology, Chinese Academy of Architecture

TITLE: "Prevention and Control of Curvature of Hydrological Drill Holes"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 55-59

ABSTRACT: Curvature of hydrological drill holes is very unfavorable for construction and the finished well. Reasons causing slanted or crooked holes include the geological condition, the installation of the drilling equipment, and the human work procedure. Methods of preventing the occurrence of slanted or curved holes are discussed separately in accordance with the different causes. Methods of repairing a curved hole to cause it to become more straight are also discussed.

AUTHOR: LI Qiulan [2621 4428 1526]

ORG: Third Ministry of Machine Industry Surveying Company

TITLE: "Contraction Tube Comparison Experiment"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 60-63

ABSTRACT: When draining tests are carried out in several work sites in the Northwest and the Northeast, the author and colleagues used the contraction tube method, the triangular holding tank method, and the volume method simultaneously to compare the results. The contraction method and the volume method are found to produce fairly close results. When the triangular holding tank method and the volume method are compared, the two are found to be very different. The flow volume deviation of the triangular holding tank method is found to be 13.5 times that of the contraction tube method. The latter is obviously more accurate and easier to use. Results of the experiment with all 3 methods are listed in tables for comparison. The structure and the method of installing the contraction tube are described.

AUTHOR: ZUO Keqian [1563 0344 6197]
HUANG Zipei [7806 5261 1014]
SHAO Junqi [6730 0193 4388]

ORG: All of Tianjin Municipal Bureau of Geology

TITLE: "Preliminary Research on Pasted Gravel Water Filtration Tube"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 63-65, 74

ABSTRACT: Pasted gravel filtration tube is a newly created well water filter. Synthetic resin is used to paste suitable pieces of gravel on the outside of a tube or pipe, made of either metal, or plastic, or fiberglass steel. Many types of adhesive may be used. In the experiment, the relatively inexpensive phenol-formaldehyde resin and ordinary steel pipe are used. The method of making the pasted gravel filtration pipe, the advantages of the pipe compared with the traditional coil filtration pipe, and diagrams depicting the structure of the experimental well are given.

AUTHOR: HA Chengyou [0761 2110 4368]
WANG Huaiyin [3769 2037 7336]
YANG Ping [2799 1627]

ORG: HA, WANG of Institute of Geological Mechanics; YANG of Beijing Hydro-geological First Team

TITLE: "Principle of Existence of Close-to-Surface Lithoclasic Water in the Plain of Beijing"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 66-68

ABSTRACT: Based partially upon the data collected by the First Hydro-geological Team of Beijing Bureau of Geology, the authors discuss the principle of distribution of shallow lithoclasic water in the plain of Beijing with the emphasis on the area between the West Beijing uplift and the Daxing uplift. The shallow lithoclasic water is supplemented primarily by the rain of the mountain region and the surface water. Due to the construction of reservoirs and channels, the natural condition of the surface water has been changed and in various degrees, the quantity of ground water supplement has been reduced accordingly. The authors, therefore, conclude that it is not suitable to single out shallow lithoclase water for evaluation. There should be a combined assessment of the surface water, the Quaternary shallow layer ground water, and the shallow lithoclasic water to treat all three as a unified entity.

AUTHOR: WANG Wei [3769 3555]

ORG: Shandong Provincial Academy of Electrical Designing

TITLE: "Application of Hydrothermal Balance Equation in the Calculation of Underground Flows"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 69-72

ABSTRACT: The hydrothermal balance relationship equation is proposed by a Soviet scientist. In China, it has been used to calculate surface flows. This paper proposes that it is also accurate for computing underground flows. When it is thus used, a large quantity of hydro-meteorological data of China may be used to serve the work of assessing the underground water resources. At the same time, when the hydrothermal balance equation is applied, underground water data of many years may be easily computed to create a condition for computing the minimum rate of underground flows. The water flow balance equation, the thermal balance equation, and the relationship between water balance and thermal balance are explained before introducing the hydrothermal balance relationship equation. There is also a table demonstrating the method of using the equation to obtain the underground flow and the guaranteed rate of ground water in Huangxian Experimental Station from 1965 through 1971 when the amount of rainwater supplement and irrigation water supplement is known.

AUTHOR: TAN Zengren [6223 1073 0117]

ORG: Hydro-geology Second Team, Gansu Provincial Bureau of Geology

TITLE: "Method of Computing the Rate of Surface Water Supplement for the Amount of Subterranean Water Extracted from the River Valleys"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 73-74

ABSTRACT: The subterranean water of river valleys is being extracted and used in greater amounts than the quantity of natural supplement in some regions. For example, at present the subterranean water of Huanghe Valley in Lanzhou Basin is being used at a rate several times higher than the natural supplement. In some small river valleys, the quantity of water taken from a single well is higher than the total natural supplement of the section. There is yet no satisfactory method of calculating the quantity to be taken however. This paper proposes a method of using the river valley subtarranean water table curve to find its fastest rising speed V, the duration in a year when there is water in the river bed T, the area of surface supplement F, and the rate of supplement μ to arrive at the equation $Q = \mu VTF$ (M^3/year), Q being the quantity extracted in a year. Sample calculations are given.

AUTHOR: WU Daren [0702 6671 0086]

ORG: Fujian Provincial Designing Academy of Industrial and Civilian Construction

TITLE: "Experiment With Artificially Forced Ejection of Warm Springs"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 75-76

ABSTRACT: China is extremely rich in geothermal resources, but at present, when ground water of a temperature higher than 100°C is extracted, the high-pressure steam causes gas backup so that the vacuum pump cannot be operated for any sustained period of time. For the purpose of resolving the problem, the author used an automatic ejection installation at a certain warm spring in Zhangzhou of Fujian Province. The installation contains parallel hot and cold water pipes, an air compressor, and a cold water pump. When air is pumped into the well, the spring water of a temperature of 100°C is discharged out of the hot water pipe and hot steam is discharged from the cold water pipe. When cold water is pumped into the well through the cold water pipe, the discharge of hot water stops 18 minutes later. The structure of the experimental installation and the geology of the location of the warm spring are described.

AUTHOR: ZHANG Zunbao [1728 6690 1405]

ORG: Urban Surveying Brigade, Hebei Province

TITLE: "Reconstruction for Ballistic and Rotary Dual Purpose Drill"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 p 77, 76

ABSTRACT: In the zone before the mountain in Hebei plain, thick layers of gravel with rich water-containing limestone below them are extensively distributed. In the past, to extract the ground water, the ballistic drill is used first to drill through the gravel strata until the bedrock appears before a rotary drill is used for the limestone. This paper describes the method adopted by the Urban Surveying Brigade to reconstruct the CZ-30 ballistic drill and make it into a dual purpose equipment. The reconstructed drill has been in use for more than a year. By eliminating the procedure of changing a drill, 6 days of labor is saved for every well. Some problems, including the transmission, the weight, and the volume of the equipment, remain to be perfected in the future.

AUTHOR: ZHU Dequan [2612 1795 0356]

ORG: None

TITLE: "Negative Electrode Protection of Wells and the Problem of Groundwater Pollution"

SOURCE: Beijing GONGCHENG KANCHA [ENGINEERING SURVEYING] in Chinese No 1, 22 Jan 80 pp 78-79

ABSTRACT: This paper is a translated excerpt of a paper by E.A. Ritchie, originally appearing in GROUND WATER Vol 14 No 3, 1976 pp 146-149.

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CSO: 4009

AUTHOR: SUN Yunlong [1327 0061 7893]
CHEN Yongjiang [7115 3057 3068]

ORG: None

TITLE: "I Operated a Speedboat for Chairman Mao"

SOURCE: Beijing JIANGCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 2-3

ABSTRACT: This is a tale told orally by SUN and written down by CHEN. On 20 Sep 58 SUN was working in Wuhu Shipbuilding Plant on the Yangzi River when Chairman MAO arrived suddenly. A representative of the military pointed out to the Chairman the No 227 Torpedo-boat at the nearby dock to explain that it had been assembled by the workers of the plant. Chairman MAO asked if he could ride in it. Being the chief engineer of No 227, he took the Chairman and his entourage for a 30-minute spin on the river. Twenty years have passed. SUN recalls his good fortune on that day to be near the Chairman, and reiterates his determination to carry out the will of the Chairman and to defend China's territorial waters with all his efforts. A photo of SUN shaking hands with the Chairman taken 20 years ago accompanies the paper.

AUTHOR: WANG Jiangang [3769 0256 0474]

ORG: None

TITLE: "Place and Development of Shipboard Guns a Modern Navy"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 3-4

ABSTRACT: Once upon a time, for several centuries, nations, such as Portugal, Spain, Holland, and England ruled the oceans with their gun-carrying battleships. With increased quantity of torpedoes during the WWI, guns were no longer the only weapons on board the ship while Japan's use of air bombardment and aircraft carriers during its attack on Pearl Harbor further reduced the importance of armored battleships. By the end of 1950's guided missles appeared to have completely replaced guns as naval weapons. Since the 1970's, shortcomings of guided missles, including high cost, limited quantity, and short duration, began to be noticed. Today, the various naval countries have again turned their attention to the research and development of shipboard guns, mainly various types of light weight automatic artillery systems. Advantages of guns over other modern weapons are very briefly discussed.

AUTHOR: FU Zhenzhou [0265 2182 3166]

ORG: None

TITLE: "A Powerful Weapon for Advancing Toward the Ocean Floor--Discussing the Submersibles"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 5-6

ABSTRACT: The history of spherical steel vessels and crafts for use in undersea observation beginning with the one made by a German in 1855 and ending with the FNRS 2 and the Trieste made by the Swiss scientist Auguste Piccard is briefly told. The difference between a bathysphere suspended by an umbilical cord like cable and the manoeuvrable mesoscaphe and bathyscaphe is disscussed, including the record dive to a depth of 11 km by Jacques Piccard and a U.S. naval officer on 23 Jan 60 in the Trieste after it was purchased by the U.S. government at a very high price. A drawing roughly describing the structural parts of a bathyscaphe is included.

AUTHOR: XU Desheng [1776 1765 0524]

ORG: None

TITLE: "Underwater Habitats and Future Cities of the Ocean Floor"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 8-9, 16

ABSTRACT: The longer a diver stays down underwater, the longer he must decompress in order to return safely to surface pressure. For any given depth, however, there is a saturation point at which body tissues are saturated with inert gas; after that, no matter how long a worker stays under pressure his decompression time does not increase. Experiment with saturation diving began in 1958. In 1962, a Frenchman [Capt. Jacques-Yves Cousteau] succeeded in remaining in his Conshelf I habitat about 10.5 m below the Mediterranean Sea for 8 days. This record has since been surpassed several times and the experimental target is to maintain habitats at 610 m and below. In the future, cities may be built under the water, with elevators to communicate with the surface world. Drawings are included to depict undersea habitats and ocean floor cities of the future.

AUTHOR: FU Yilin [3940 0001 2651]

ORG: None

TITLE: "Types of U.S.S.R. Submarines"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 12-13

ABSTRACT: The U.S.S.R. now has more than 370 submarines of all types plus more than 100 submarines in the reserve category. The number of nuclear submarines increases continuously, and the conventional submarines are gradually being converted for the reserve. The following 4 relatively newer types are introduced, with a photo and a brief description: (1) The Tango class attack-type conventional powered submarine first appeared in Jul 73. It is known to have a relatively large sonar and possibly a large rubber covering. (2) The Alfa class attack type nuclear powered submarine is the third generation. Two have been completed. They may have a new type of propulsion installation to provide a higher speed and level of automation. (3)The GolfII guided-missile conventional powered submarine. (4) The Delta II class guided-missile nuclear-powered submarine. Of the average number of 12 submarines constructed every year in the U.S.S.R. about half are either Delta II or Delta III classes, which were first reported to appear in Nov 73.

AUTHOR: TIAN Zhixi [3944 3112 0823]
SHI Chaoting [0670 2600 1656]

ORG: None

TITLE: "How Do Airplanes Take Off From an Aircraft Carrier"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 14-16

ABSTRACT: Most modern fighter planes are of subsonic or supersonic speed, with a takeoff speed of 250-350 km/hour or more, requiring a minimum of 2500 to 3500m runway. At present, the deck of the largest airplane carrier is no longer than 300 m and it must accommodate simultaneous takeoff and landing of airplanes. How is that to be done? The theory of takeoff of airplanes and techniques to provide the conditions for takeoff when the runway is short are explained. Methods enabling fixed-wing airplanes to takeoff and land on the deck of an airplane carrier are discussed. Since the 1970's carriers for vertical lift and landing airplanes have appeared, but those are still very few.

AUTHOR: YE Ming [0673 6900]

ORG: None

TITLE: "Several Submarine to Land Guided Missiles of the U.S.S.R."

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 p 13

ABSTRACT: This paper includes the serial number, the year of initial installation, the flight distance (km), and the condition of use of 6 types of guided missiles: (1) SS-N-4, 1958, 650-1300 km, on Z class and G class conventional and H class nuclear submarines; (2) SS-N-5, 1963, 1200-2400 km, on GII class conventional and H II class nuclear submarines; (3) SS-N-6, 1967, 2400-3000 km, on Y class nuclear submarines; (4) SS-N-8, 1971, possibly reaching 8000 km, on D I, DII, and some Y classes of nuclear submarines; (5) SS-N-17, 1977, possibly reaching 4400 km, on Y class nuclear submarines; (6) SS-N-18, 1977, possibly reaching 8500 km, on D II class nuclear submarines.

AUTHOR: ZHAO Yulian [6392 3768 5571]

ORG: None

TITLE: "Brief History of Diesel Engine Technology for Battleships"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 pp 23, 19

ABSTRACT: Diesel engines appeared toward the end of the 19th century. Since then, several important technical improvements have occurred. These include the fuel injector pump, compressed air charge, the use of heavy oil for fuel, and certain structural and material redesigning. Compared with the diesel engines of the 1940's, the efficiency of those of the 1970's is 15-20 percent higher, while the weight and size are reduced 40-50 percent. Furthermore, diesel engines are being continuously improved; for instance, the cooling of the cylinder, the monitoring and control techniques, the noise reduction, and the improvement of its economy and reliability are all being studied now.

AUTHOR: A Li [7093 6849]

ORG: None

TITLE: "Bits and Pieces About the Shipbuilding Industry in Taiwan"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 p 25

ABSTRACT: Three brief items concerning the shipbuilding industry of Taiwan are included: (1) There are more than 60 shipbuilding companies in the island. In Jan 78, the two larger ones were merged into one. The total tonnage of ships built on the island is about 1,800,000 tons per year(2) Only about 20 percent of the steel plate, 20 percent of the engines, etc. of the shipbuilding industry are self-supplied. Materials are in fact largely imported from Japan; the labor is provided by the Chinese [in Taiwan]; the business is managed by the Americans; and the resultant oil tanker is rented to the British. (3) On the island, there is a very prosperous industry of salvaging and taking apart ships. In 1970, 2,000,000 tons of ships were disassembled to create a new record in the world.

AUTHOR: GU Jiqing [7357 4764 3237]

ORG: None

TITLE: "What Causes a Ship to be Off Course?"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 p 25

ABSTRACT: Not all ships can be easily maneuvered. Some can be turned easily and can maintain the course according to the direction steered by the operator. With other ships, when the rudder is set at zero, the ship navigates slightly to the left or the right instead of in a straight line as it should. Causes for the deviation are explained in the paper to include a deformed rudder, a bent ship body, or a problem in the vertical splash board. Drawings and calculations are given to explain the function of the rudder and the other components of a boat with respect to steering a boat steadily in its course.

AUTHOR: LIU Jun [0491 1498]

ORG: None

TITLE: "Anchor and Anchor Chain"

SOURCE: Beijing JIANCHUAN ZHISHI [KNOWLEDGE OF SHIPS] in Chinese No 6, Dec 79 p 27

ABSTRACT: When a ship must be hold in a location in the water, a device is dropped overboard so that its hooks or flukes engage the bottom and prevent the ship from moving. This device is called an anchor which is attached by a cable or chain to the ship. In ancient China, anchors were also used but they were not made with iron. They were usually made of a large piece of rock. Four different styles of modern anchors are described, including the advantages, shortcomings, and different uses. Civilian ships usually have 2 anchors, one at each side of the stem, but military ships have only one, for fear of interfering with the sonar device. Proper procedure of casting and retrieving the anchor or anchors is explained also.

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